ATTACHMENT 1

2021 Interim Measure Implementation Plan

Detroit and Big Cliff Dams

Expert Panel

in response to

Interim Injunction Doc 212

Case 3:18-CV-00437-HZ

Description/Intent

On September 1, 2021, the U.S. District Court for the District of Oregon issued an Interim Injunction that directs the Corps to implement interim injunction measures intended to improve conditions for fish passage and water quality in the Willamette Valley Project (WVP) to avoid irreparable harm to Endangered Species Act (ESA) - listed salmonids during the interim period until the completion of the reinitiated consultation. These measures must be carried out "to the greatest extent practicable under existing hydrologic conditions and necessary flood control operations" while making "every effort to comply with the various water quality standards governing the WVP."

The Interim Injunction requires the Corps to carry out fish passage and water quality operations at Detroit and Big Cliff reservoirs as detailed in the Corps' Interim Measure Nos. 5-7. Interim Measure 5 modifies Detroit Dam operations during the fall drawdown and winter months by passing all flow through the regulating outlets from dusk until dawn, with no turbine operations except for station service if needed for emergencies. Interim Measure 5 also states that the Corps will manage discharge from Detroit and Big Cliff Dams to reduce TDG levels downstream of Big Cliff. Interim Measure 6 states that the Corps will operate multiple spillway gates at Big Cliff to spread total flow across the spillway and reduce TDG levels below Big Cliff when the Corps is operating the spillway. Interim Measure 7 provides downstream fish passage in the spring, and water temperature management in late spring and summer through strategic use of the spillway, turbines, and regulating outlets.

The Court assigned an Expert Panel comprised of two of Plaintiffs' experts, two NMFS biologists, two Corps employees, and two "ad hoc" Federal experts to "make a recommendation to the Court on whether the interim operation should be modified to incorporate use of the lower regulating outlets at Detroit Dam for temperature control purposes." Because only Interim Measure 7 relates to temperature control, the Expert Panel must make a recommendation on whether Interim Measure 7 should be modified to incorporate use of the lower ROs at Detroit. If deemed advisable, the use of the lower ROs would begin in 2021.[1]

Providing beneficial downstream water temperatures during the fall and early winter will delay the emergence of ESA-listed spring Chinook salmon and ensure that water temperatures do not reach lethal limits. This can be accomplished through the use of both the upper and lower ROs, in combination with the turbines, at Detroit Dam. At this time, the Corps has determined that the lower ROs can safely be used for interim downstream water temperature management provided that the operating constraints outlined below are adhered to at all times. Therefore, the Expert Panel recommends modifying Interim Measure 7 to use the lower ROs for temperature control at

[1] The Court also directed the Expert Panel to Determine whether operational measures alone are sufficient to maintain acceptable TDG levels below Big Cliff Dam and, if not, propose a reasonable timeline for designing and constructing a structural solution for mitigating excess TDG levels during spill operations. This issue will be addressed by the Expert Panel in February 2022. To facilitate this determination, the Corps will develop an assessment of the potential for operational measures to reduce TDG problem in the North Santiam River, including: known spill and total discharge TDG performance at Big Cliff Dam, historical TDG conditions and known fish effects, and the results of modeling the likely effects of alternative operational measures on TDG that include up to a 20-foot storage buffer below Detroit Reservoir's Storage Reservation Diagram from October through February.

Detroit. But note that operations designed to minimize adverse water temperature do not always easily comport with operations designed to safely and effectively pass fish.

The Court has ordered the Corps to implement Interim Measure 5 "as detailed." The Expert Panel is recommending the modification of IM 7 to include the use of the lower ROs. However, using the lower ROs at Detroit for temperature control purposes requires modifying Interim Measure 5. The Corps will submit a revised Interim Measure 5 to the Court by September 13. The Expert Panel recommends that the Court adopt the revised Interim Measure 5 (and amend its prior order if necessary) so that the Corps can implement the revised measure.

If the Court were to adopt the revised Interim Measure 5, the Expert Panel recommends the following plan for implementing Interim Measure 7 and the revised Interim Measure 5. This plan outlines information that should be used in the development of an implementation strategy that not only ensures the safe operation of the lower ROs, but the best operation for achieving downstream water temperature objectives as well.

Current Conditions and Operations

The 2021 water year (October through August) has been very dry. Low reservoir levels, combined with anticipated Project discharge of 1,500 cfs in conformance with the spawning season flow prescribed in the 2008 BiOp, makes it likely that the Detroit Reservoir WSL will fall to ele. 1500 by early October. Based on the most recent ResSim modeling, forecasts indicate that Detroit Reservoir will reach El. 1500 ft. on October 01 and below El. 1480 ft. at the end of October (see Figure 1 below and note that due to dry conditions, water elevations are tracking the 25% Elevation Non-Exceedance (pink) line). Increased discharges starting on October 01 may be required to reach elevations in which the URO (and later the LRO) can be used for downstream water temperature management. We will re-evaluate conditions on October 01 and increase outflows if necessary. [2]

[2] Plaintiffs' experts respectfully disagree. This operation would not be adequate to meet the objectives of Measure 5-7 and the Court's directive to make use of the lower ROs to control discharge water temperatures. (Interim Injunction at 10. a)). See our dissent at the end of this document.

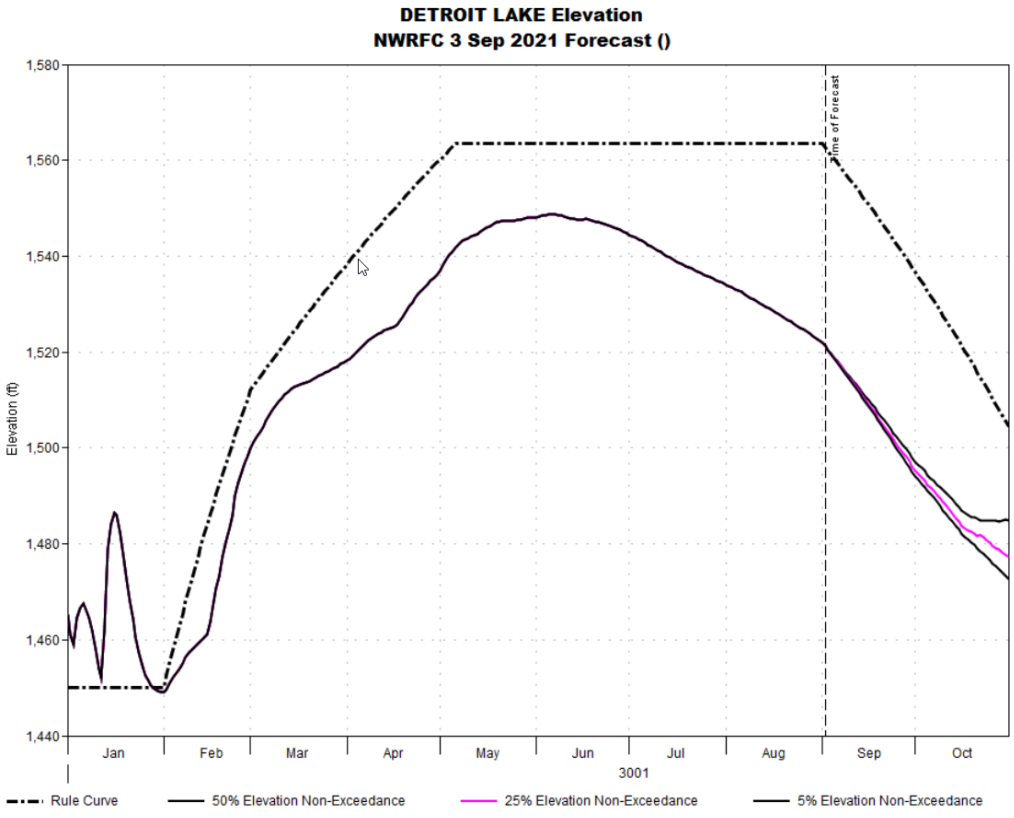


Figure 1. Forecasted Elevations at Detroit Reservoir through October 2021.

Water Temperature Targets and Discharge

Interim water temperature management operations have been conducted at Detroit Dam since 2008 to improve water temperatures downstream of Detroit Dam to benefit anadromous fish species listed under the ESA. This operation has previously been implemented by operating the spillway, turbines and upper ROs to meet agreed upon resource agencies' (NMFS, USFWS, ODFW) target temperatures for the reach of river downstream of Detroit/Big Cliff Dams (Table 1.). Water temperature management operations consist of discharging Detroit Lake's warmer surface water during the summer and early fall through the spillway and mixing it with cooler water passed through the powerhouse. At some point during the summer or early fall, as Detroit Reservoir drafts, the reservoir's water surface elevation (WSL) falls below the spillway crest elevation (ele. 1541) and all discharges from Detroit Dam are shifted to the powerhouse. While some blending does take place, the shift from the spillway to all powerhouse discharge results in an abrupt drop in downstream water temperatures, followed by a gradual warming as the drawdown brings warmer near-surface water into the powerhouse intakes. When this occurs, the upper ROs are used to cool turbine releases. Throughout the fall, as Detroit Reservoir continues to be drawn down, warm surface water starts to be pulled into the upper ROs, and discharges become too warm to meet downstream temperature targets. This warmer water accelerates egg incubation in the North Santiam River downstream from the dam, resulting in early emergence, and is considered a strong cause of poor Chinook recruitment.

To alleviate warm water discharges from the upper ROs in the late fall, the lower ROs will be utilized in 2021. These lower outlets should provide additional cool water, further improving temperature conditions for incubating fish downstream of the dam.

Table 1. Water Temperature Targets in the North Santiam River downstream of Detroit and Big Cliff Dams

Month	2018 RA Target Temperature Range Maximum / Minimum °F *	
January	42	38
February	42	38
March	44	42
April	46	42
May	50	46
June	54	48
July	55 / 60	52
August	60	52
September	54	48
October	52	46
November	46	42
December	46	41

TDG

Spills at Big Cliff with associated high TDG downstream are common during the fall drawdown and during December through January in response to freshets and floods. These events may occur during emergence of natural origin young fry, which are particularly susceptible to gas bubble trauma caused by high TDG. In addition, high levels of TDG in winter can affect adult winter steelhead that spawn between Big Cliff and Minto dams.

Minimizing downstream TDG would suggest heavy use of the Big Cliff powerhouse. However, improving fish passage survival suggests avoidance of powerhouse passage and limited use of Project powerhouses during fish passage operations. We note that fish passage survival through the Big Cliff powerhouse is remarkably high, and less than 10% less than spillway passage, so using the powerhouse to reduce downstream TDG when fish passage rates are low, may provide a lesser overall risk to juvenile survival.

Constraints and Considerations

To ensure safe water temperature management operations, the following constraints must be adhered to at all times:

a. Avoid operating the upper ROs when Detroit Reservoir elevations exceed ele. 1550 ft.
b. Do not operate the lower ROs under more than 200 feet of head (ele. 1465 ft.).

- While technically the lower ROs could be operated under more than 200 feet of head, this operation is reserved for emergency situations. Favorable water temperatures do not meet the definition of an emergency operation.
- A secondary constraint is that the gates must be opened fully for an emergency lower RO operation at greater than 200 feet of head. Because the gates cannot be operated between 80% open and full gate opening a sudden, large, flow increase would occur when the pool rises above ele. 1465 ft.

c. When Detroit Reservoir is between elevations 1265 ft. and 1465 ft. (NGVD29) operate the lower RO gates between 10% and 80% gate opening, or fully open.
d. Avoid operating the upper and lower ROs on the same side of the dam due to air demand issues.
e. Refrain from throttling flow on the upper south RO.
f. RO outflows of greater than 1,000 cfs are known to produce TDG in exceedance of 110%. This should be avoided unless actively fighting a flood.
g. The Corps' flood control mission is prioritized over all other actions and at no time will human health or safety be jeopardized during the implementation of this measure.

In addition to the constraints, the following considerations were used to develop the Detroit LRO implementation plan:

a. The north lower RO gate should be prioritized over the south gate to reduce erosion concerns in the stilling basin located just downstream of Detroit Dam.
b. Adaptive management should be expected by the Corps. This implementation strategy lays out a plan for what we think water temperature, weather and hydrologic conditions will be as we transition from summer to fall. While water temperature targets will be achieved at the best of our abilities, they may be missed for days at a time.
c. It is generally accepted that the Big Cliff spillway provides a safer passage route for downstream migrants than the turbine units. However, the use of the Big Cliff spillway in conjunction with Detroit RO spill is known to produce TDG well above state water quality standards (110%). For that reason, Big Cliff spill should be carefully conducted when spilling at Detroit. The Corps' TDG Calculator[3] will be used to inform the real time management of spill at both projects to ensure downstream TDG remains below the gas cap. Spreading spill across multiple bays at Big Cliff Dam can help to alleviate downstream TDG, so it may be possible to spill and provide a safer passage route for fish when outflows are high.[4]
d. The Corps will also manage flood flows closely and reduce situations which may force excess spill and TDG production in the North Santiam River. This would

[3] Developed by Norm Buccula in 2020.

[4] Under an average reservoir elevation of 1195', the minimum gate opening of one Big Cliff spillbay (0.75 ft.) would release about 980 cfs. To spread spill, total flows of greater than 1,960 cfs would be necessary to spread spill evenly across two bays, and flows of greater than 2,940 cfs would be necessary to spread spill evenly across three bays.

include avoiding high spill rates following a flood surcharge when existing conditions and weather forecasts allow.

e. Once Detroit Reservoir is drawn down to el. 1500 ft. and below, the ROs should be used exclusively at night to provide safer fish passage, with turbine operation during the day.
f. In order to gain the maximum benefit, water temperature management through the lower RO should take precedence over exclusive upper RO use for the period between initial use of the lower RO and reservoir turnover.

Recommendation and Implementation Plan

Taking the constraints and considerations described above into account, as well as information collected in 2015 when the lower ROs were last used for downstream water temperature management, the following implementation plan has been developed for the 2021 season. Note that this plan is tied to the hydrologic and meteorologic conditions of this year; next year's plan is likely to look different. What will not change from year to year is the overall goal of the operation and the constraints.

Recent Detroit Reservoir levels (in Figure 2) show 2021 to be similar to 2018, and potentially 2015 or 2019 if dry conditions persist into fall. In 2015, both the upper RO and lower RO were used for temperature control and this data provides a reference for temperature management under that operation (Figure 3). The temperatures within Detroit Reservoir, associated with the depths of each Detroit Dam outlet, are also shown in Figure 3 with the downstream temperatures observed at Niagara (below Big Cliff Dam; BCLO). As shown, temperature varies in each year and will depend on inflow temperature, meteorologic conditions, lake levels, and whether the lower RO is used. While these historic temperatures are informative, they do not incorporate the effects of using the lower RO and releasing cold water reserves within the hypolimnion throughout the fall. Notably, in all 5 previous years shown, the upper RO and lower RO temperature seem to be identical by late November. This is a guideline for the likely end of the proposed operation.

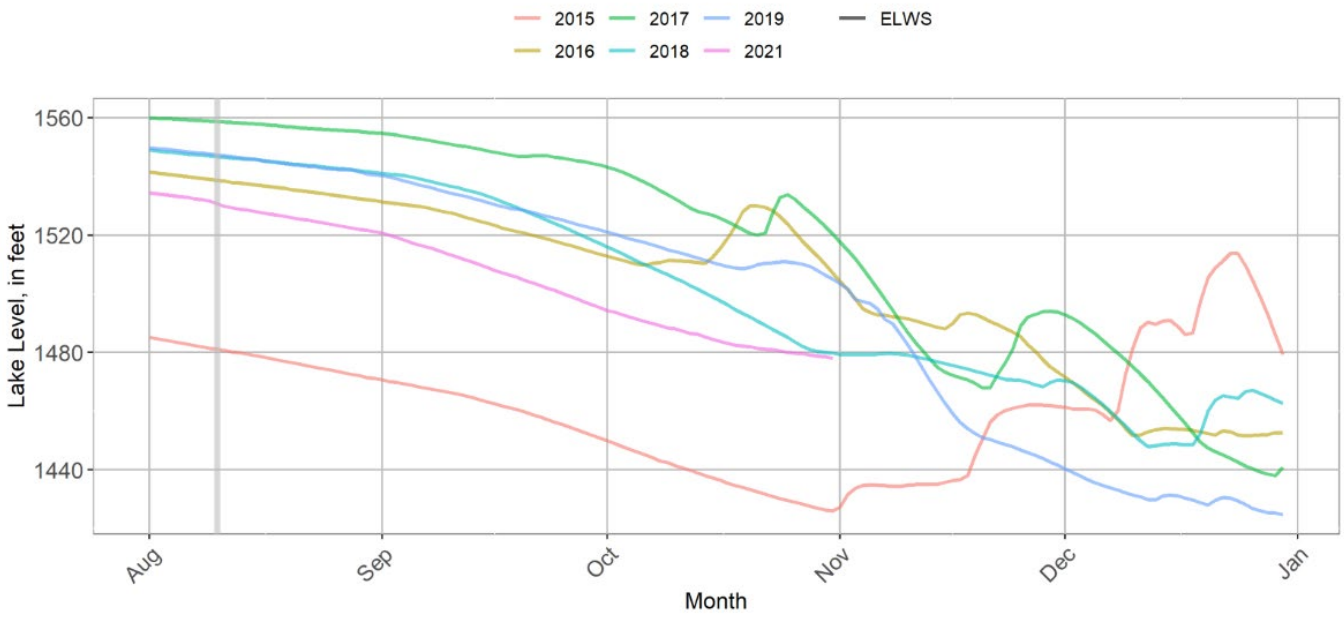


Figure 2. Historic Detroit Lake Level in Recent Years (2021 is forecasted in ResSim reservoir).

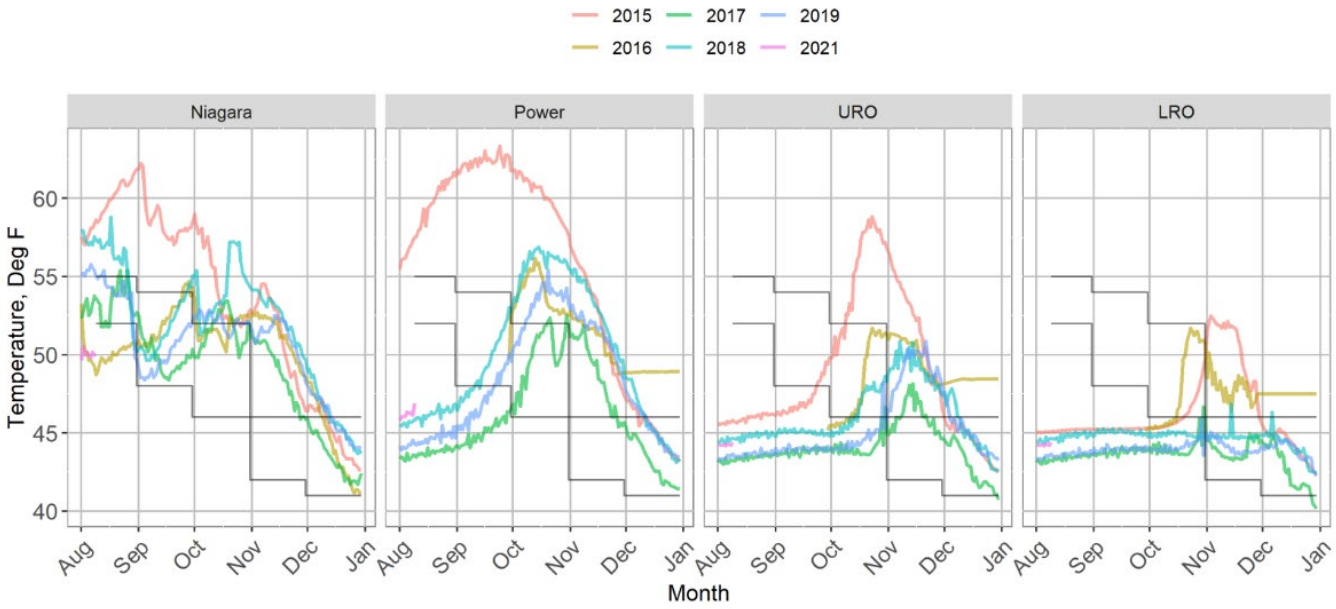


Figure 3. Recent and Historic Water Temperatures in Detroit Lake (at depth of Power, URO, LRO) and Downstream (Niagara) in Recent Similar Hydrologic Years. Grey line represents temperature operational targets.

If we assume similar water temperature conditions as in past years, cooler water will be necessary in late September or early October to meet the downstream water temperature targets. The Corps will start with a blend of turbine and upper RO discharges, then transition to all upper

RO discharges once turbine water is too warm to use. Water temperatures will be consistently monitored at the downstream BCLO or USGS Niagara gauge.

It is anticipated that by mid- to late-October, discharges will need to transition from the upper ROs to the lower ROs to access the cold water reserved in the lower elevations of Detroit Reservoir. Due to dry/drought conditions, the Detroit Reservoir is lower than typical years and is expected to be at an elevation in which the lower ROs can be safely operated when needed for downstream water temperature management. This may not be the case in years when the reservoir refills fully. In those cases, additional water may need to be discharged from the reservoir in order to safely operate the lower ROs when needed.

The lower ROs will be utilized until the reservoir "turns-over", or becomes isothermal, which is forecasted to occur sometime in early to mid- to late-November. In-reservoir thermal conditions will be continuously monitored to verify when lake turnover occurs, at which point, discharges will revert back to the turbines during the day and the upper ROs at night (for downstream fish passage and implementation of Interim Measure #5).

The upper RO is expected to pass most of the fish when operated. It also offers substantial cooling for most of the fall. The lower RO provides the coolest water available. It is not possible to determine, in advance, how best to distribute flows among the ROs. Previous operations using just the upper RO and powerhouse for temperature control resulted in elevated water temperatures during incubation once the warm water layer reached the level of the upper RO and before reservoir turnover. In order to gain the maximum benefit, water temperature management through the lower RO should take precedence over exclusive upper RO use for the period between initial use of the lower RO and reservoir turnover.

Success will be evaluated based on water temperatures as recorded at the USGS Niagara gaging station (USGS 14181500) and compared to the water temperature targets in Table 1. Realtime and/or adaptive management will be necessary. The WATER Flow Management and Water Quality Team (FWQMT) will continue to meet as often as necessary (and as determined by NMFS and the Corps) to discuss optimal temperatures and the realtime management of this operation.

Implementation Plan Summary

In summary, the following operational plan is proposed:

1. Continue to release water through the Detroit turbines until water temperatures warm to near the upper threshold of the water temperature target. This is estimated to occur in early to mid-October.
2. Once turbine releases, alone, cannot achieve downstream water temperature objectives, begin blending turbine releases with cold water from the upper ROs. Monitor downstream conditions.
3. Transition to full upper RO releases when necessary and hold these releases until all cold water is depleted and downstream water temperatures start to near the upper temperature target threshold.

4. Once the upper ROs can no longer be utilized to meet downstream water temperature objectives, transition all flows to the lower ROs. This is estimated to occur sometime in mid-to late-October. Continue to release discharges through the lower ROs until the reservoir "turns over" or becomes isothermal. This is expected sometime in early to mid-November.
5. Once the reservoir is isothermal, transition all flows back to the turbines/upper ROs and begin the implementation of Interim Measure 5. This is expected sometime in early to mid- to late-November.
6. Interim Measure 6 will be carried out whenever necessary.

Potential Impacts and Mitigation

The lower RO operation will be scheduled during shift change, whenever possible, so that there are two operators on site during initiation of the operation.

The lower ROs should be opened to a 1.5 foot gate opening. Flows through the outlet will depend on forebay elevation but will range from ~820 to 775 cfs.

Spill can sometimes create high TDG levels downstream of Detroit and Big Cliff Dams. Adjustments to turbine and non-turbine outflows may be necessary to make sure TDG remains below 110% to the greatest extent practicable under necessary flood control operations.

Biological Goal

Regional biologists have established that water temperature below dams in the North Santiam is higher than would occur naturally, which has resulted in the early emergence of juvenile salmon. Higher water temperature results in accelerated development of eggs and early emergence of fry. For example, emergence for early spawners downstream of Detroit and Big Cliff dams has been estimated to occur in early to late December compared to late February upstream of the dam. A study of emergence indicated the first fry caught in the North Santiam below the dams was in early December, about 50 days earlier than the first fry captured in the McKenzie River upstream of Leaburg Dam where water temperature was more normative (Schroeder et al. 2016). The goal of the modification to Interim Measure 7 is to improve water temperatures for fish.

Biological Monitoring

The following was developed to address the goal of the Interim Injunction to "provide meaningful research, monitoring, and evaluation ("RM&E") of the interim measures." RM&E for the fall 2021 temperature control operation was developed on a very short timeline and therefore may not be as robust as in a more developed plan. However, the objective of this RM&E is to learn as much as possible from the fall 2021 operation to inform not only this year's operation, but outyear operations as well. In addition, because of the short timeframe to submit this plan, a more detailed RM&E plan will be prepared by the Expert Panel later this fall or early 2022. Some of the RM&E proposed below relates to Interim Measure 7, while other RM&E

relates to the revised Interim Measure 5. If the Court adopts the revised Interim Measure 5, the Corps will conduct RM&E as detailed below. [5]

A. Water temperature will be monitored, continuously and in real-time, in Detroit Reservoir
B. TDG will be monitored, continuously and in real-time, downstream of Detroit/Big Cliff dams at the USGS Niagara gage. Additionally, ODFW collects TDG at the Minto Fish Facility. This information will be used to inform future operations at the Detroit/Big Cliff complex.
C. The effect on water temperatures released from Detroit/Big Cliff Dams will be used to calculate emergence timing. The relationship between Accumulated Thermal Units (ATUs) and fry emergence has been established and will be quantified. However, similar temperature units can be reached under different thermal regimes (e.g., relatively stable daily temperatures v. highly variable temperatures) but emergence can differ among thermal regimes. In addition to calculating mean daily temperature, daily temperature variation should be calculated and compared to previous years. No physical monitoring of fry emergence should be needed unless temperature control results in a large change in daily variability of temperatures.
D. Spawning surveys are planned and will be conducted below Detroit and Big Cliff dams. Collect data on location of redds and depth of water over a subset of redds in shallow water to provide a baseline for monitoring potential effects of flow decreases during incubation. Compare estimated emergence timing downstream of dams to timing upstream of Detroit Dam (using USGS gage below Boulder Creek) and to data from previous years.
E. Passage timing, numbers, and size distribution of juvenile Chinook salmon will be monitored with capture of fish in a rotary screw trap. Metrics will be compared to previous years when the lower RO was not operated to assess effects of prioritizing temperature control on passage.
F. Mortality associated with passage conditions at Big Cliff Dam will be monitored through capture of fish in a rotary screw trap and release of marked fish upstream of Big Cliff Dam, if available, during different operational conditions (e.g., spill v. turbine).
G. Operate a rotary screw trap below Big Cliff Dam to capture, measure, and sample fish.
    1. Enumerate juvenile salmon caught in the trap.
    2. Conduct periodic trap efficiency tests for expanding the trap catch to estimate the number of salmon leaving the reservoir. Because trap catch may be low and because fish caught in the trap may be kept for holding mortality studies, juvenile hatchery salmon may be used for the tests. Tests should be conducted at different flows. A minimum of two tests should be conducted for each major flow change. The purpose of this metric is to assess passage timing and numbers of fish relative to use of the lower RO for temperature control, compared to previous years.
    3. Measure (fork length) randomized sample of fish throughout outmigration period to provide length frequency of outmigrants. The purpose of this metric is to provide information about the life history of the juvenile salmon passing the dam relative to the 2021 temperature control measure compared to previous years.

[5] Plaintiffs' experts disagree with the federal parties tendency to view RM&E on a measure by measure basis rather than a more holistic approach. Our dissent is appended at the end of this document.

H. Collect information on condition and mortality of fish passing Big Cliff Dam by catch in rotary screw traps. Mortality information would be tracked and recorded relative to operations at Big Cliff Dam to assess effects of various spillway passage conditions and/or turbine passage. Fish will also be observed for Gas Bubble Trauma (GBT).
    1. Record condition of captured fish outmigrating from the reservoir including degree of de-scaling, injuries, degree of copepod infestation, etc.
    2. If possible, and if fish are available, hold juvenile salmon caught in the trap every week (during lower RO operation) to directly assess delayed mortality (aim for 30–50 fish per week). Fish for the test should be held as close to the trap as possible (e.g., portable tanks near Detroit or Big Cliff dams); or at Minto fish collection facility, but in a location not subject to high levels of TDG. Mortality would be monitored and recorded for 24 hours.
    3. Trap efficiency tests will be used to isolate effects of dam passage from effects of the trap. In future years, release a control group of marked juvenile hatchery fish upstream of the trap and hold these fish separately from fish being held in RM&E activity #C2.
    4. Remove fish from trap as early as possible in the morning to minimize exposure to TDG during periods of spill.

I. Because studies will likely require the use of surrogate fish to ensure adequate release numbers for statistical analysis, hatcheries should be directed to collect extra eggs in September 2021 to provide surrogate fish beginning in 2022. The Expert Panel will be developing additional implementation plans for other subbasins that may identify studies requiring surrogate fish. If eggs are not collected this fall, then studies requiring surrogate fish would have to be postponed until 2023 at the earliest.

Dam Safety Considerations

An inspection of the LRO conduits should be conducted once the operation is complete. The Corps will institute a graduated monitoring program throughout the use of the outlets until confident that the system response is predictable. Additionally, the Corps will conduct a bathymetric survey of the stilling basin post-LRO implantation to monitor potential scour and erosion.

Hydropower Impacts

If hydropower production were eliminated from ~mid-October -~mid-November, approximately 17% loss of power generation, and an associated loss of revenue, would occur throughout the critical power production period, with a range of 6% to 30% across water years.

Transmission Considerations

Because there is no load tapped off of the transmission lines that bring Detroit's generation onto the rest of the transmission system, the overall transmission system should be able to absorb the loss of generation at Detroit for about a month between mid-October and mid-December without major impacts.

The aggregate impacts of the concurrent loss of generation at Detroit, Cougar, Foster and elsewhere in the Willamette Valley will result in generation from remote areas east of the Cascade mountains being brought in to meet load centers west of the Cascade mountains. This will increase the stress on the West of Cascades South and South of Allston transmission pathways, particularly during heavy load conditions such as those caused by a cold snap.

Plaintiffs' Experts' Dissents

2021 Draft Operations

The federal parties propose to operate the project this year in a manner that would not allow operation Detroit Dam's lower ROs until mid-November. They have also stated that by mid-to late November the reservoir turns over and becomes isothermic. Once the reservoir becomes isothermic, operation of the lower ROs would no longer provide substantial temperature benefit. To be beneficial, the lower ROs need to provide cooler water than that available to the powerhouse or upper ROs. Thus, the operation proposed by the federal parties would provide little benefit from operating the lower ROs. We have recommended that the Corps increase discharge immediately to at least 2,000 cfs because our analysis shows that at least that rate of discharge is needed to provide a high likelihood of the reservoir being at or below ele. 1465 by mid-to late October, the maximum WSL for safe operation of the lower ROs. Actually, our analysis is about a week old, and every day at the current rate of discharge (~1,600) continues the higher the flow needed to achieve ele. 1465 by mid-to late October.

The federal parties argue that releasing 2,000 cfs or more now could risk dewatering redds when flows subsequently decline to the incubation season minimum of 1,200 cfs. We note, that the range adopted in the 2008 BiOp for spawning through incubation ranged from a 3,000 cfs spawning season maximum to a 1,200 cfs incubation season minimum. Clearly, NMFS viewed the risk of redd dewatering over that range of flows to be acceptable in 2008. No new information has been provided to support the narrowing this flow range.

Even if operations designed to put the lower ROs in service by mid- to late October did result in the dewatering of some redds, an outcome we do not expect, it would affect only some of the incubating eggs. Adverse water temperatures would affect all redds and all incubating eggs. Given the very poor recruitment currently being observed in the North Santiam River, efforts to control both water temperature and TDG are needed. Drafting the reservoir quickly enough to make use of the coldest water available is needed to reduce adverse water temperatures downstream from the project in a timely manner.

A Holistic Approach to RM&E

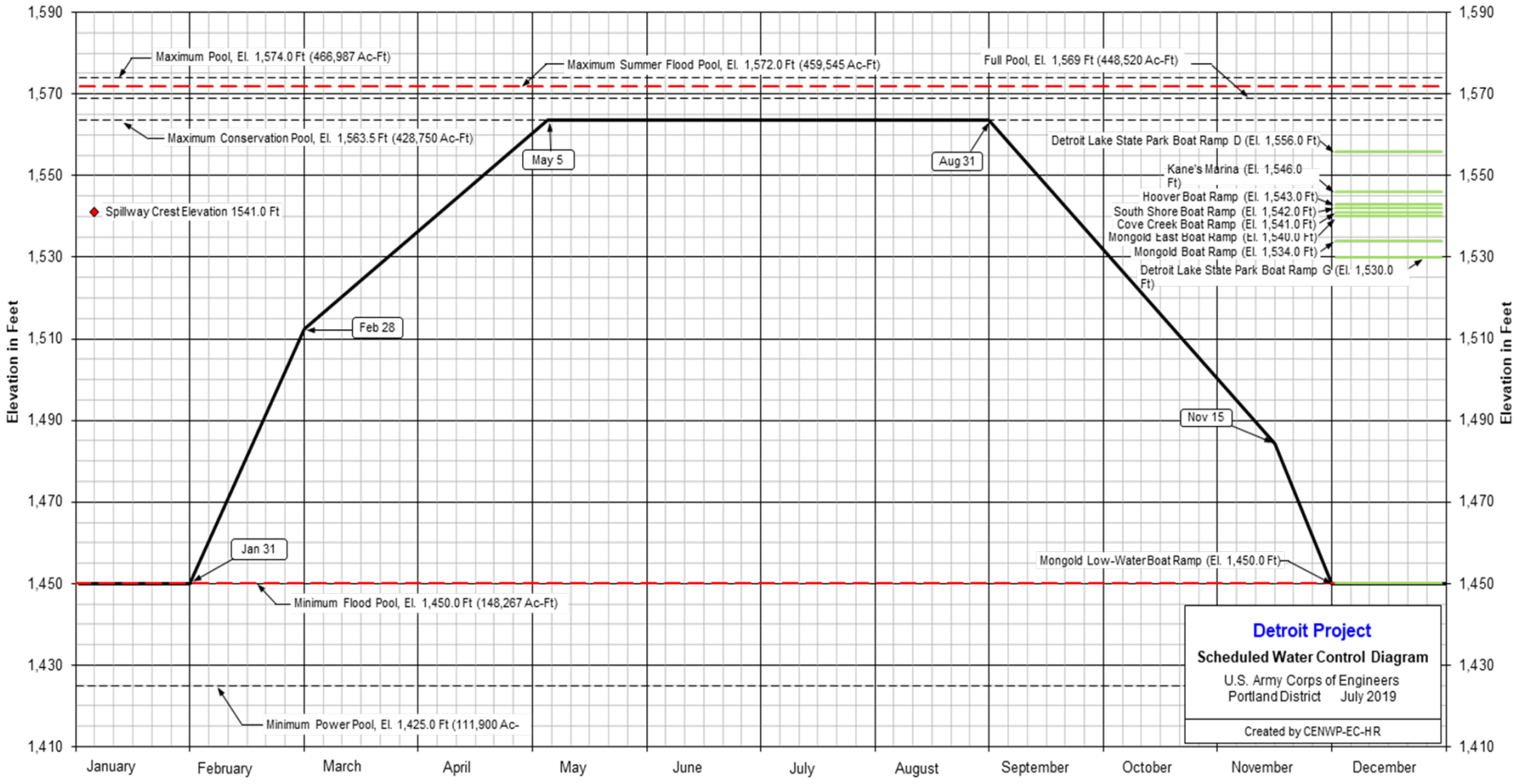
The primary goal of Interim Measures (IM) 5–7 is to improve conditions for listed salmon and steelhead in the North Santiam River. These North Santiam measures are inextricably linked, they are not completely separate and distinct measures that function independently of each other. The Federal experts have indicated they intend to request permission from the Court to modify IM 5. Plaintiff's experts agree that IM 5 must be modified to incorporate use of the lower RO and that this is actually implicit in the original assignment to the Expert Panel (10a). In

addressing the need for the Expert Panel, the Court stated: "Less clear is how some of the injunction measures can be implemented in a comprehensive manner that balances the potential tradeoffs, accounts for the multifarious variables, and provides the most benefit to the listed salmonids." (Section V, pp 28–29). The RM&E conducted under this order should be designed to address these often interacting variables to identify measures that most benefit listed salmonids.

In drafting RM&E plans, the federal parties have tended to view the assignment narrowly, adopting measures that may meet the needs of an individual measure but do not always work together well or make the best use of the information gathered. To meet the intent of the Court, the Plaintiff's experts believe the Expert Panel's approach must be inclusive not reductive. Operations conducted under IM 5–7 have considerable overlap and potential tradeoffs. For 2021, the Panel has recommended that water temperature management take precedence over fish passage for the period between initial use of the lower RO and reservoir turnover. Operations for temperature control may also require spill through RO that raises the possibility of elevated TDG that will have to be managed at Big Cliff Dam. Therefore, the Plaintiff's experts believe the Panel must address and assess potential tradeoffs between temperature control, fish passage, and water quality; including potential effects on spawning of elevated discharges needed to reach target levels. This should be considered in the revision to Measure 5.

In summary, the Plaintiff's experts believe the Expert Panel should address the three integrated aspects of Detroit and Big Cliff operations as they relate to providing benefits to listed salmonids: fish passage, temperature control, and water quality or TDG. Interim RM&E were proposed in this plan by the Plaintiffs' experts to address fish passage and TDG tradeoffs and benefits as relates to temperature control operations. The comprehensive RM&E plan to be developed later MUST incorporate these three aspects as relates to implementation of IM 5-7. In other words, RM&E should be designed to answer what North Santiam dam operations will provide the "most benefit to the listed salmonids".

Detroit Reservoir Water Control Diagram



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